First name:_____Last name:_____
i.d. (last 4 digits only):_____

Midterm 2

Organic Chemistry 2
CHEM222 and CHEM234
March 15, 2013, 6:15-9:00 pm

INSTRUCTIONS:

Please write your **Name and ID number** in the space provided **above, and on the scantron**.

This is a Closed Book Examination. The weight of each question is as follows:
1-25 are worth **2 points** each
26-30 are worth **3 points** each
31 is worth **2 points**
32- is worth **3 points**
33 is worth **8 points**
34 is worth **10 points**
35 is worth **5 points**
36 is worth **7 points**.

Note that the exam is printed **on both sides of the paper**. There is a **blank page at the end.** Answer multiple choice questions on the scantron provided (pen or pencil), and long answer questions directly on the exam paper ***in ink***.

Molecular models and pen/pencils are allowed.
Course notes, calculators, dictionaries, or electronic devices are NOT allowed.

READ ALL QUESTIONS CAREFULLY

At the end you must **hand in ALL pages**, and hand in the **scantron separately.**

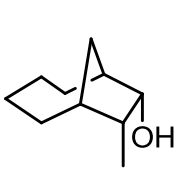
McGill University values academic integrity. Therefore all students must understand the meaning and consequences of cheating, plagiarism, and other academic offenses under the code of students conduct and disciplinary procedures.

Good Luck!

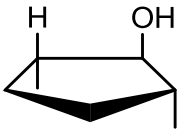
Version 001

*****UNLESS SPECIFIED, FOR ALL QUESTIONS, ASSUME THAT REACTION WORK UP OR QUENCHING IS CARRIED OUT BEFORE PRODUCT PURIFICATION**

1- Which of the molecules below CANNOT be prepared using hydroboration/oxidation?



a)



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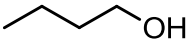
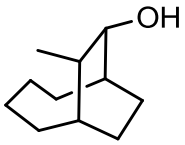
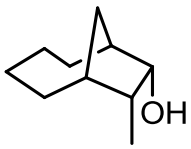


c)

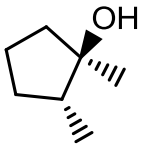


d)

2- Which of the molecules below CANNOT be prepared using oxymercuration/demercuration?

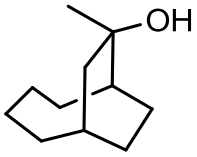


a)



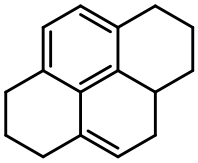
b)

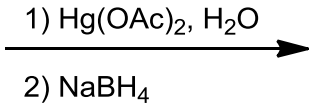
c)

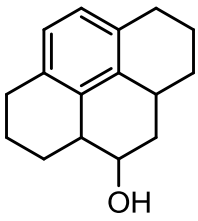


d)

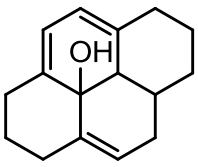
3- What would be the major product for the reaction shown below?







a)



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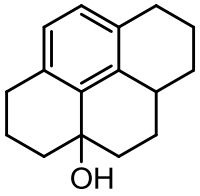

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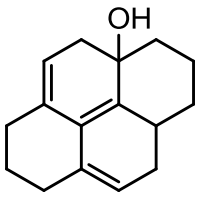
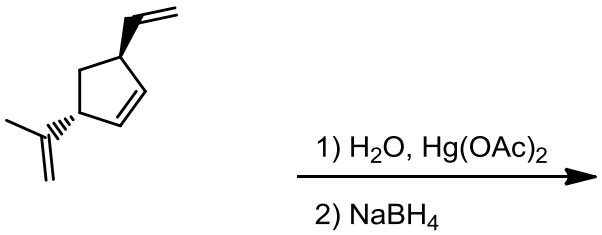
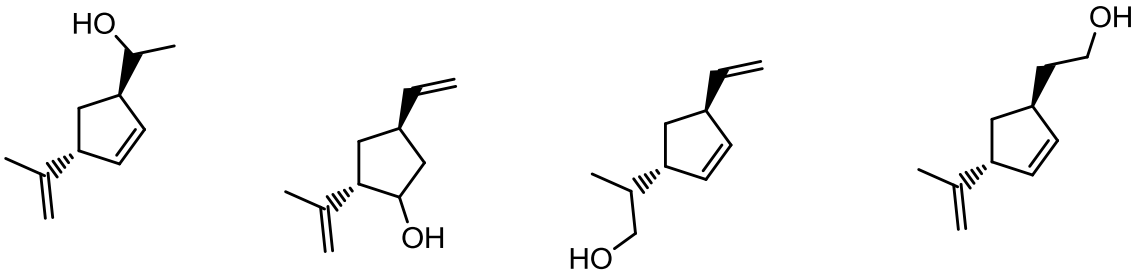


d)

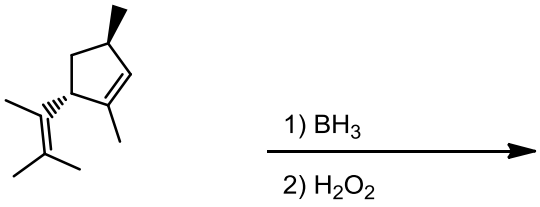
4-What would be the major product for the following reaction sequence?

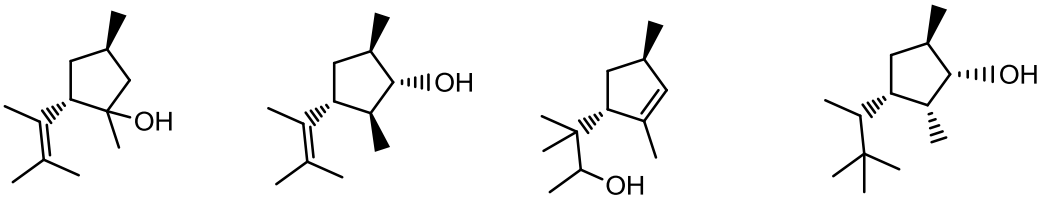




a) b) c) d)

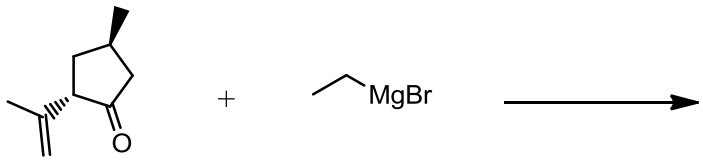
5-What would be the major product for the following reaction sequence?

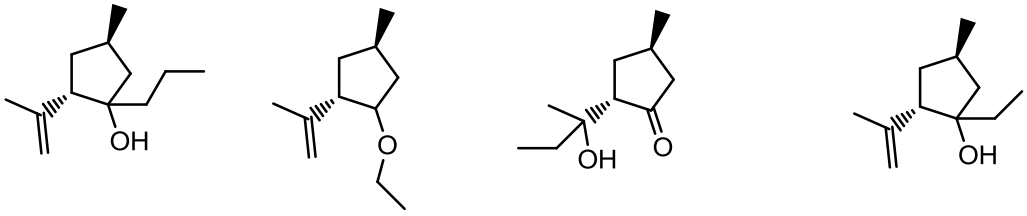




a) b) c) d)

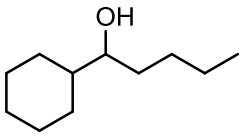
6-What would be the major product for the following reaction sequence?



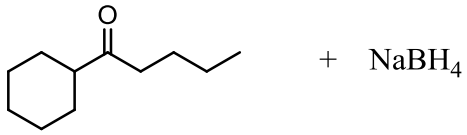


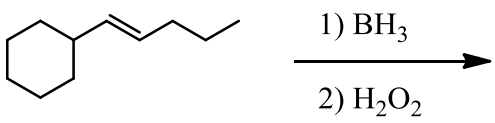
a) b) c) d)

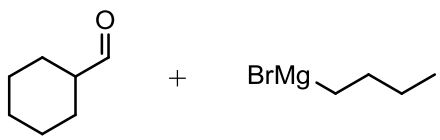
7-Which of the reactions below does NOT yield the product below as the major reaction product?



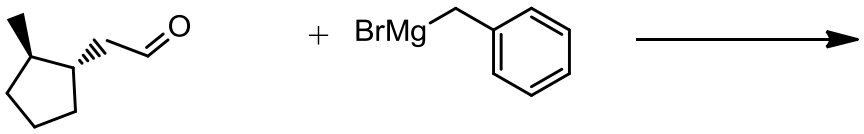
a) 

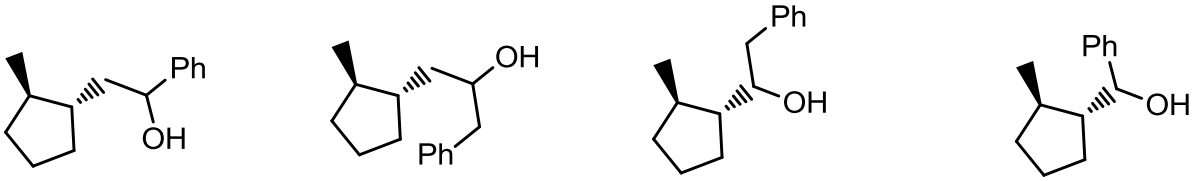
b) 

c) 

d) 

8- What is the expected major product of the reaction below?



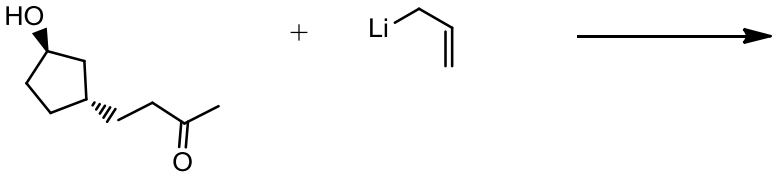


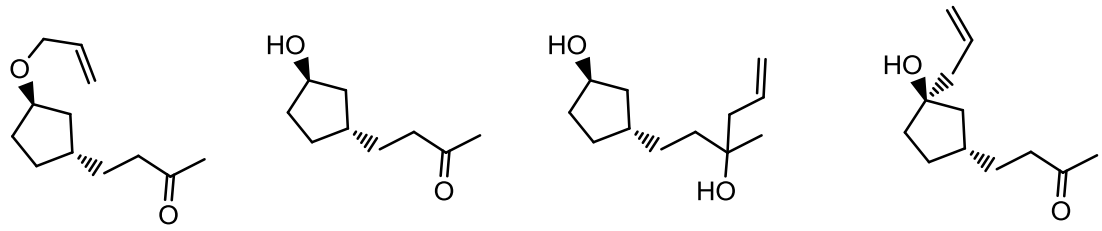
a) b) c) d)

9- Which of the reagents listed is best to fully deprotonate an alcohol?

a) $CH_3C(CH_3)_2CH_2MgBr$
b) K_2CO_3
c) NaOH
d) HCl

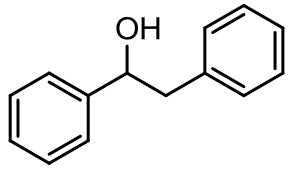
10- What is the expected major product of the reaction below?





a) b) c) d)

11- What is the best way to prepare the compound below?



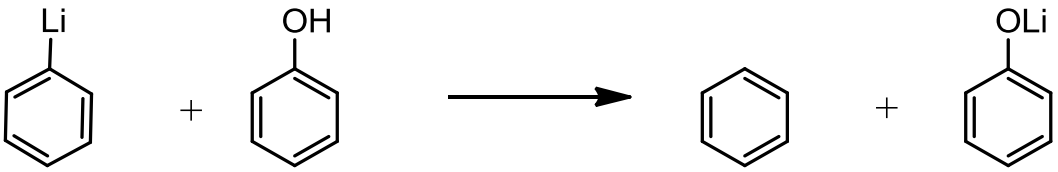
a) Ph CHO + PhMgBr

b) $PhCH_2CH_2MgBr$ + Ph-CO-Ph

c) $PhCH_2MgCl$ + PhCHO

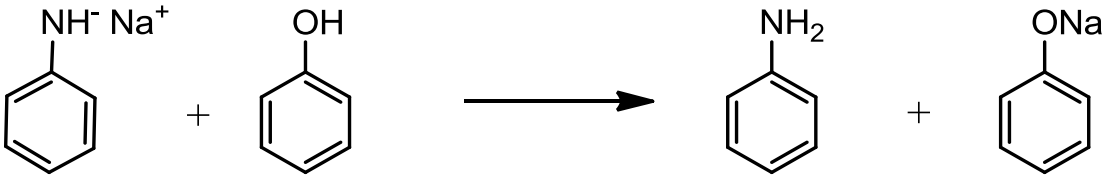
d) Ph-CO-CH_2-Ph + PCC

12-Would the reaction below proceed forward or is the reverse process more favored?



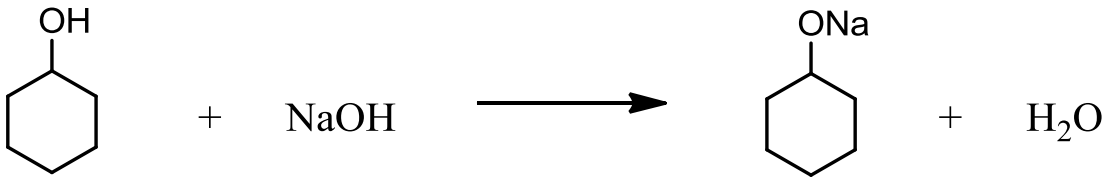
a) **forward**
b) **reverse**

13-Would the reaction below proceed forward or is the reverse process more favored?



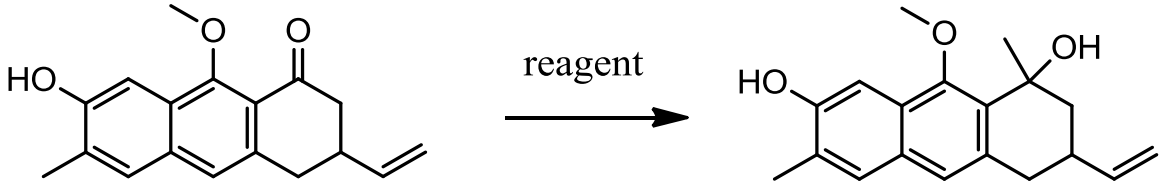
a) **forward**
b) **reverse**

14-Would the reaction below proceed forward or is the reverse process more favored?



a) **forward**
b) **reverse**

15- Before performing the following functional group transformation, what reaction would be necessary?



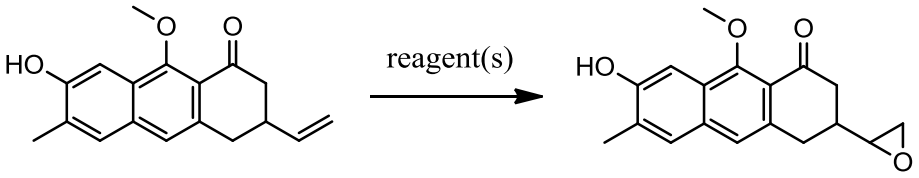
a) oxidation of the ether

b) reduction of the double bond

c) reaction of the alcohol with $(CH_3)_3SiCl$

d) protection of the ketone

16-Which of the conditions below would be the best to carry out the following transformation?



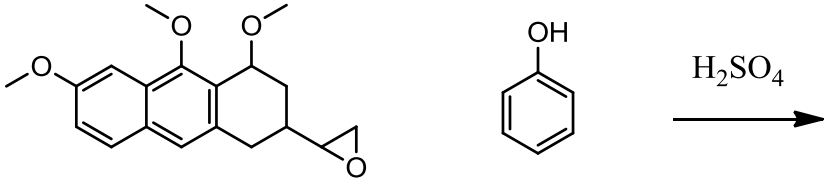
a) $CH_3CH_2CH_2CH_2CO_3H$

b) Cl_2, $FeCl_3$

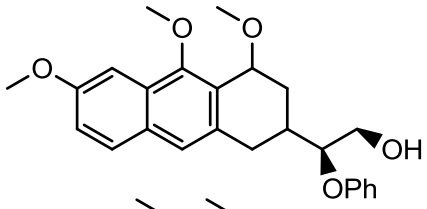
c) H_2O_2

d) H_2CrO_4

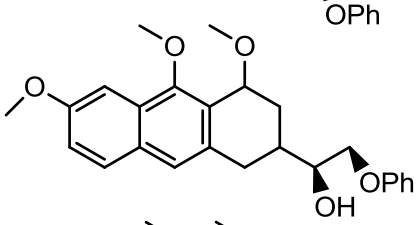
17-What would be the major product of the following reaction?



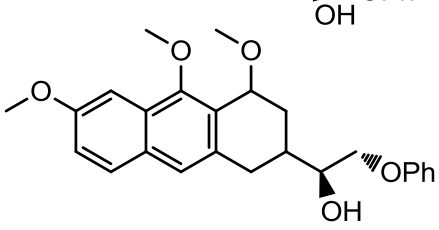
a)



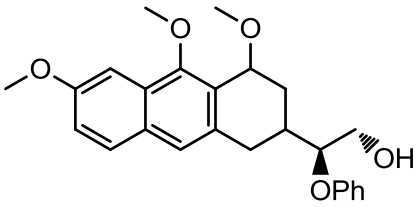
b)



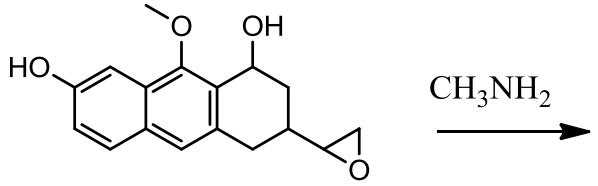
c)



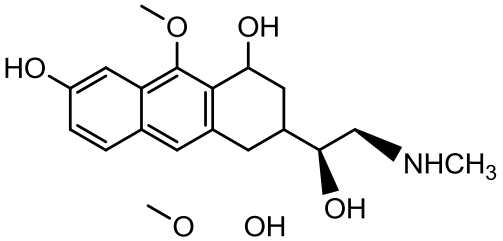
d)



18-What would be the major product of the following reaction?



a)



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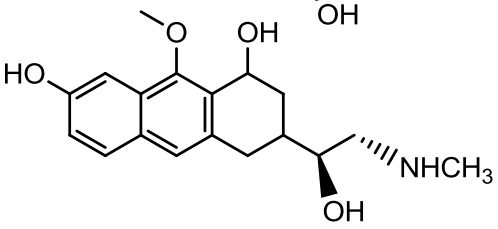
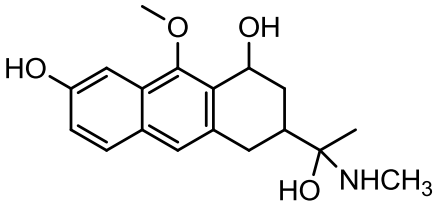
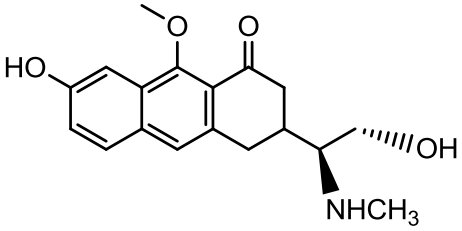


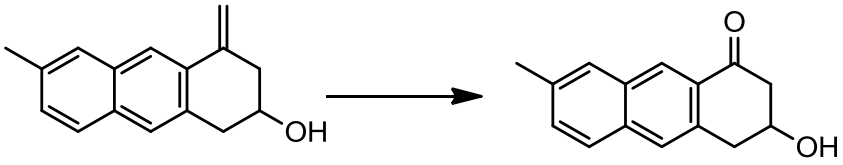
c)



d)



19-What is the best reagent for the following transformation?



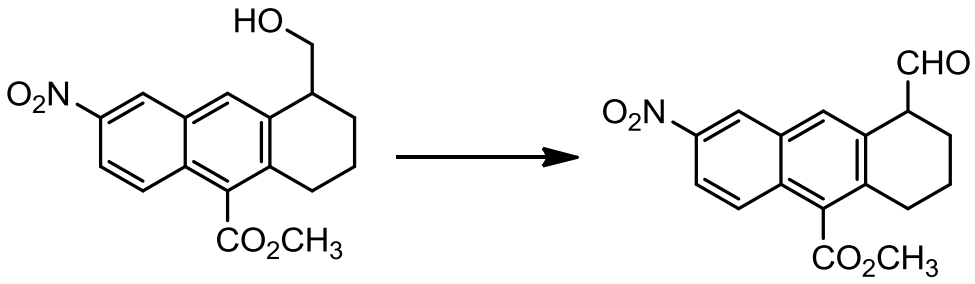
a) $KMnO_4$

b) $NaBH_4$

c) PCC

d) O_3 followed by Et_3N

20- What is the best reagent for the following transformation?



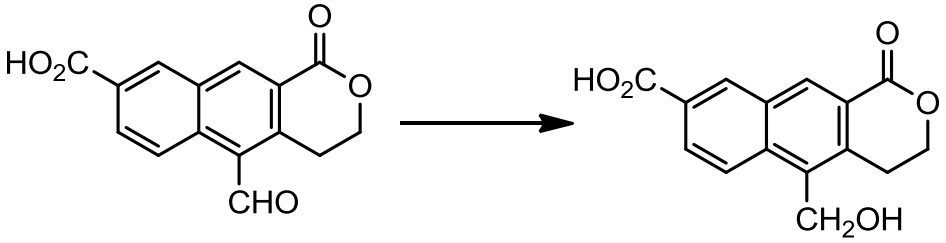
a) $KMnO_4$

b) $NaBH_4$

c) BH_3

d) PCC

21-What reagent would be the best one to carry out the following transformation?



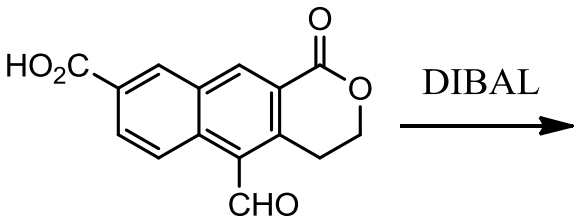
a) PDC

b) $NaBH_4$

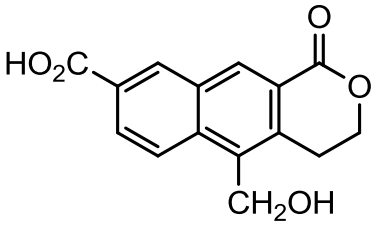
c) $LiAlH(OCH_3)_3$

d) BH_3

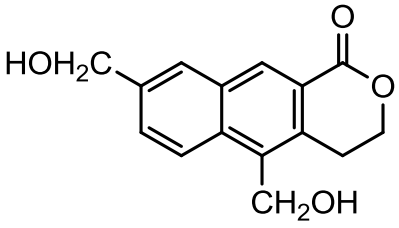
22- What would be the product of the following reaction?



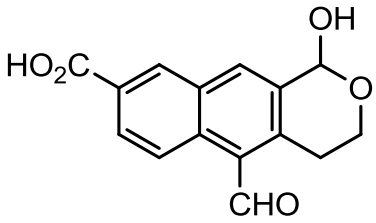
a)



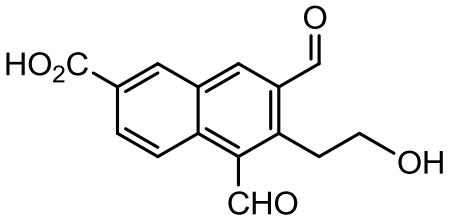
b)



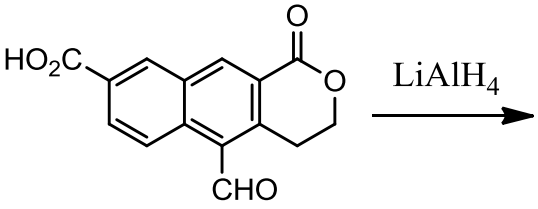
c)



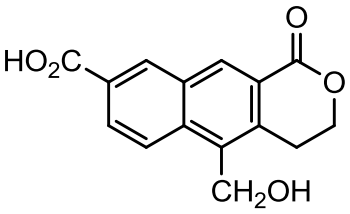
d)



23- What would be the major product of the reaction below?



a)



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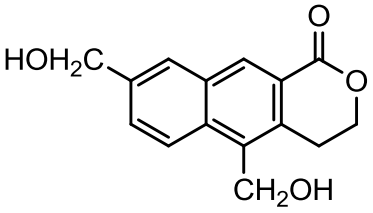
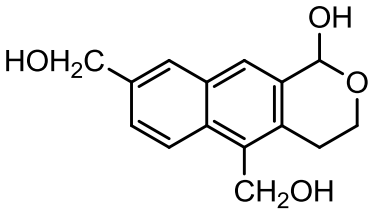
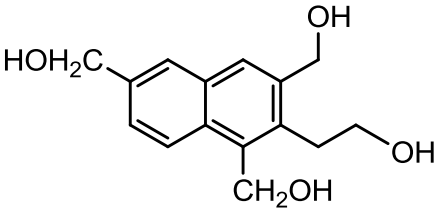


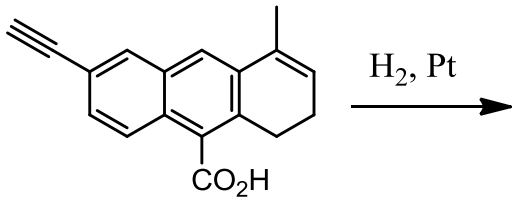
c)

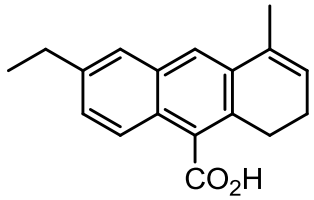


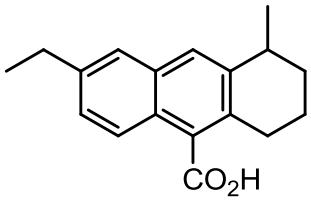
d)

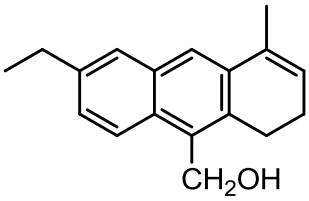


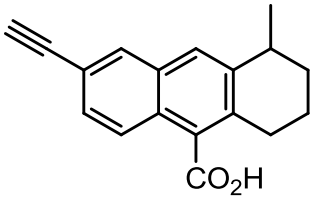
24- What would be the major product of the reaction below?



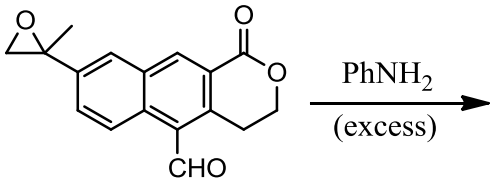
a) 

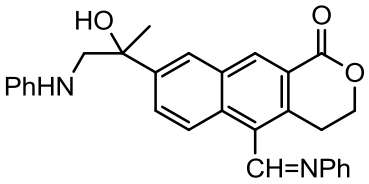
c) 

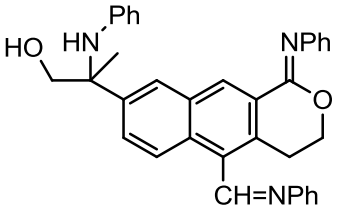
b) 

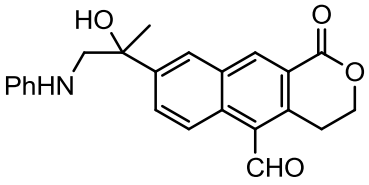
d) 

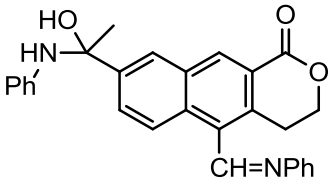
25- What would be the major product of the reaction below?



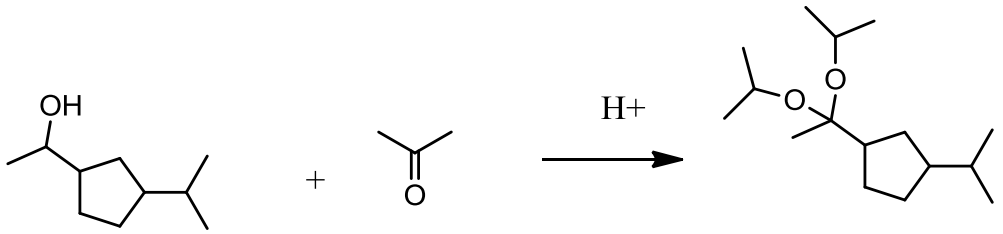
a) 

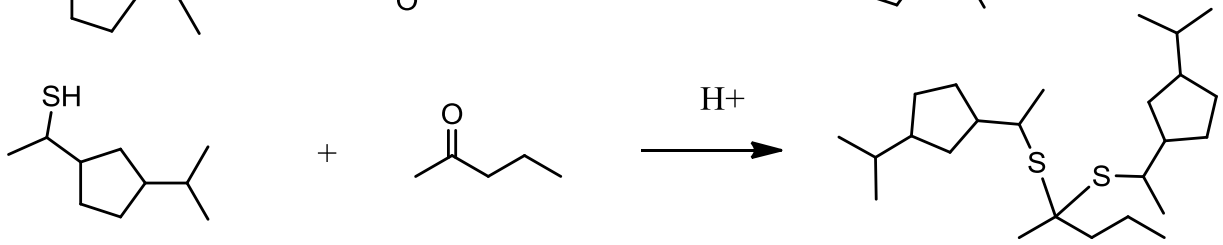
c) 

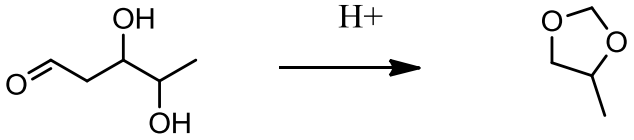
b) 

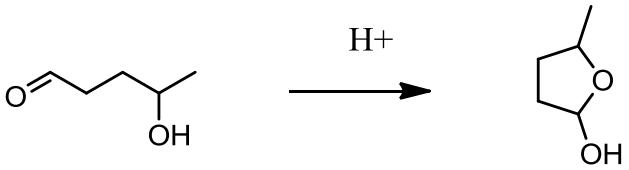
d) 

26- Which of the reactions below is likely to take place as described?

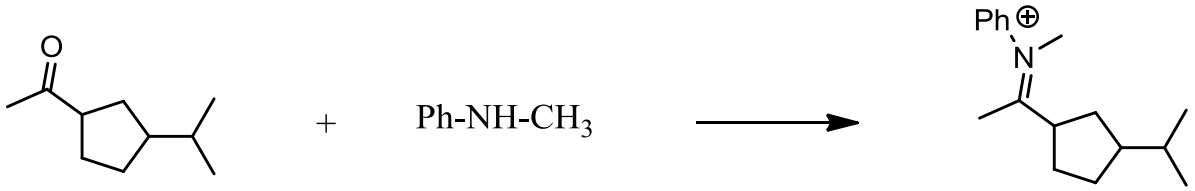
a) 

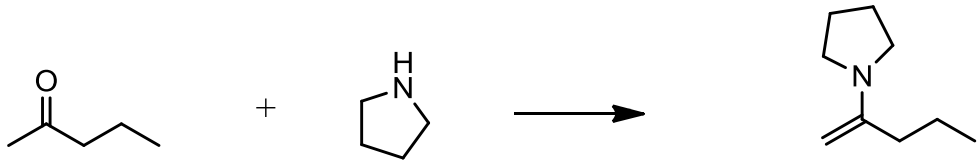
b) 

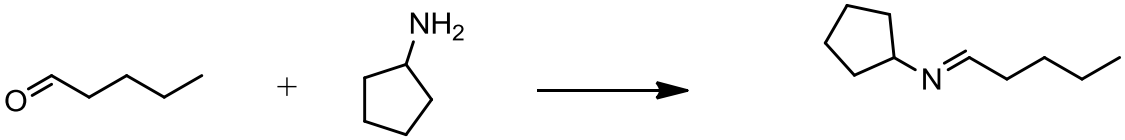
c) 

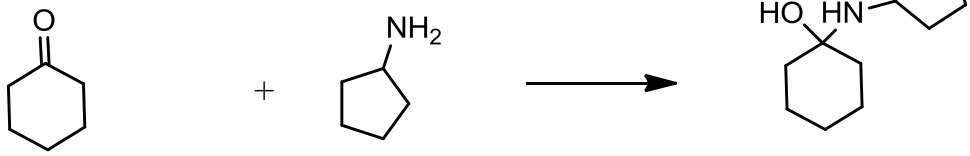
d) 

27- Which of the reactions below is likely to take place as described?

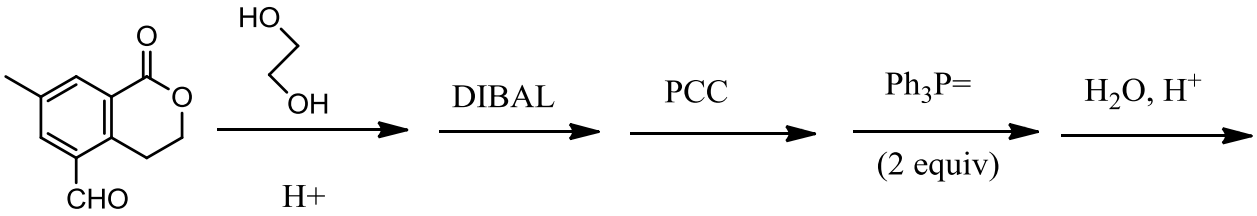
a) 

b) 

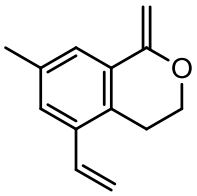
c) 

d) 

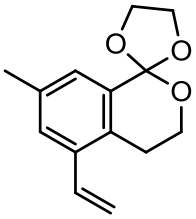
28- What would be the main product of the following reaction sequence?



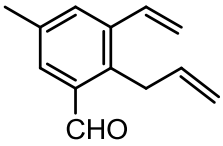
a)



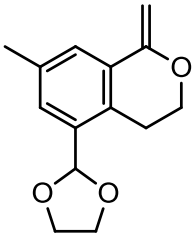
c)



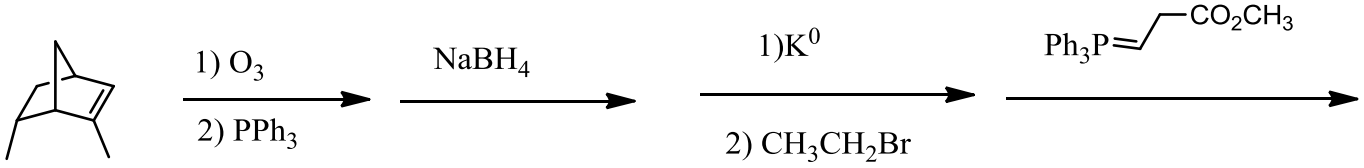
b)



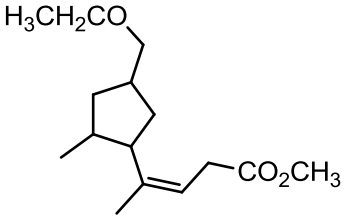
d)



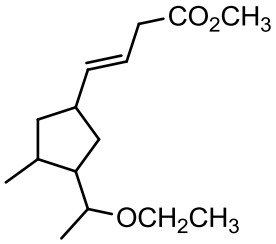
29- What would be the main product of the following reaction sequence?



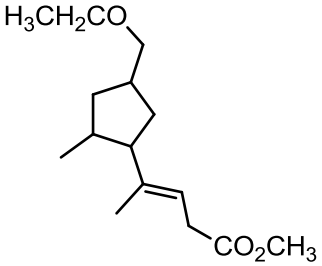
a)



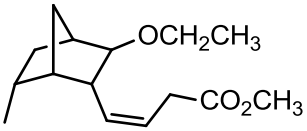
b)



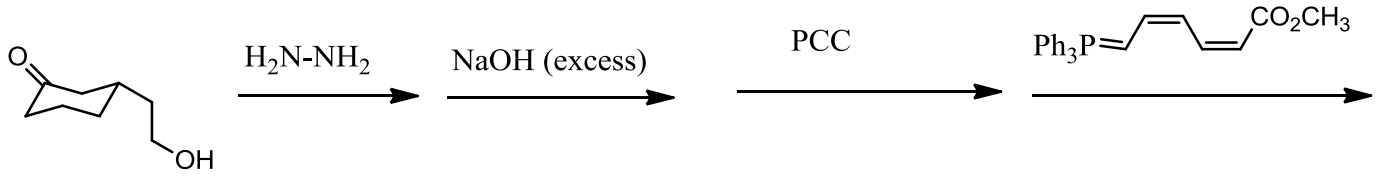
c)



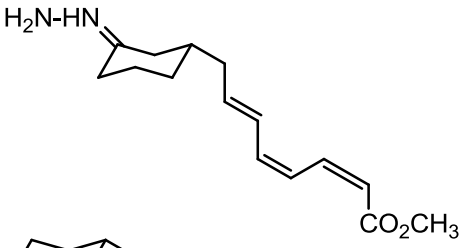
d)



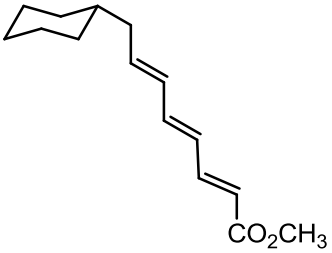
30- What would be the major product of the reaction sequence below?



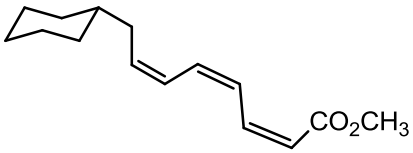
a)



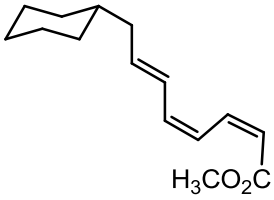
b)



c)

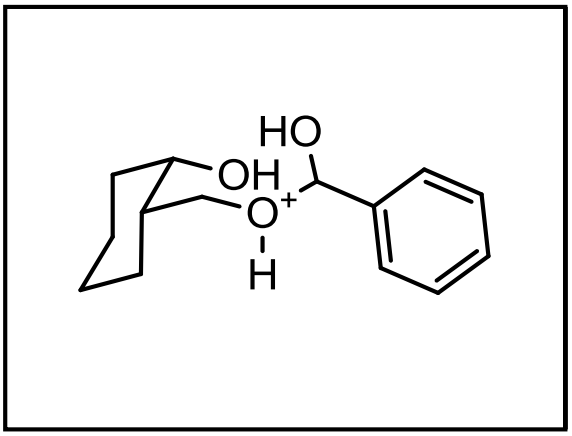


d)

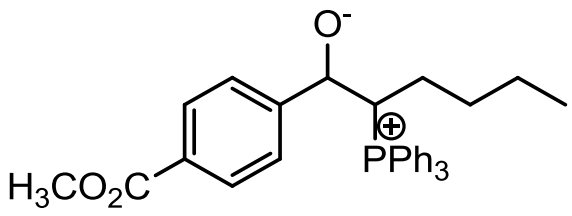


FOR QUESTIONS 31-36, WRITE YOUR ANSWER DIRECTLY ON THIS EXAM PAPER, IN THE APPROPRIATE BOX. ANYTHING OUTSIDE THE BOX WILL NOT BE GRADED

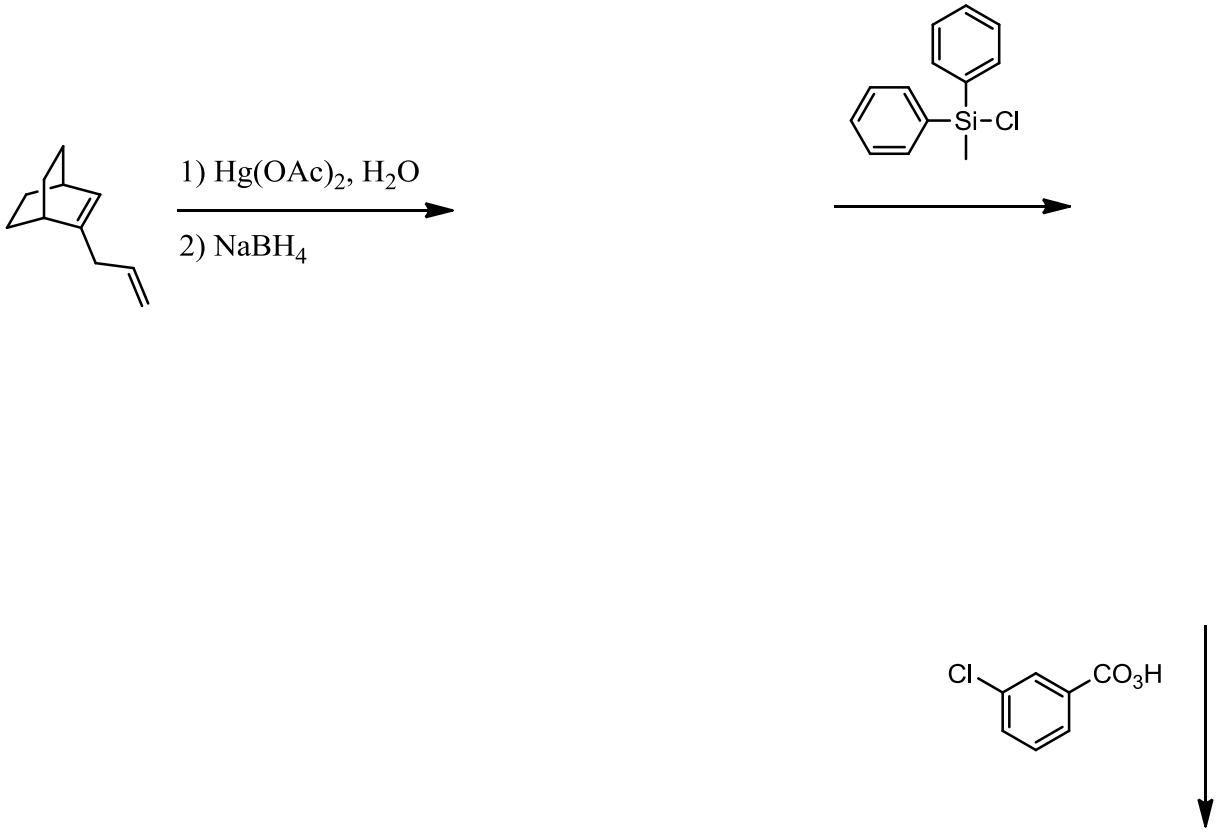
31-The intermediate below forms during acetal cleavage. Show with 1-2 arrows directly on the structure below what happens in the next step after formation of this intermediate?



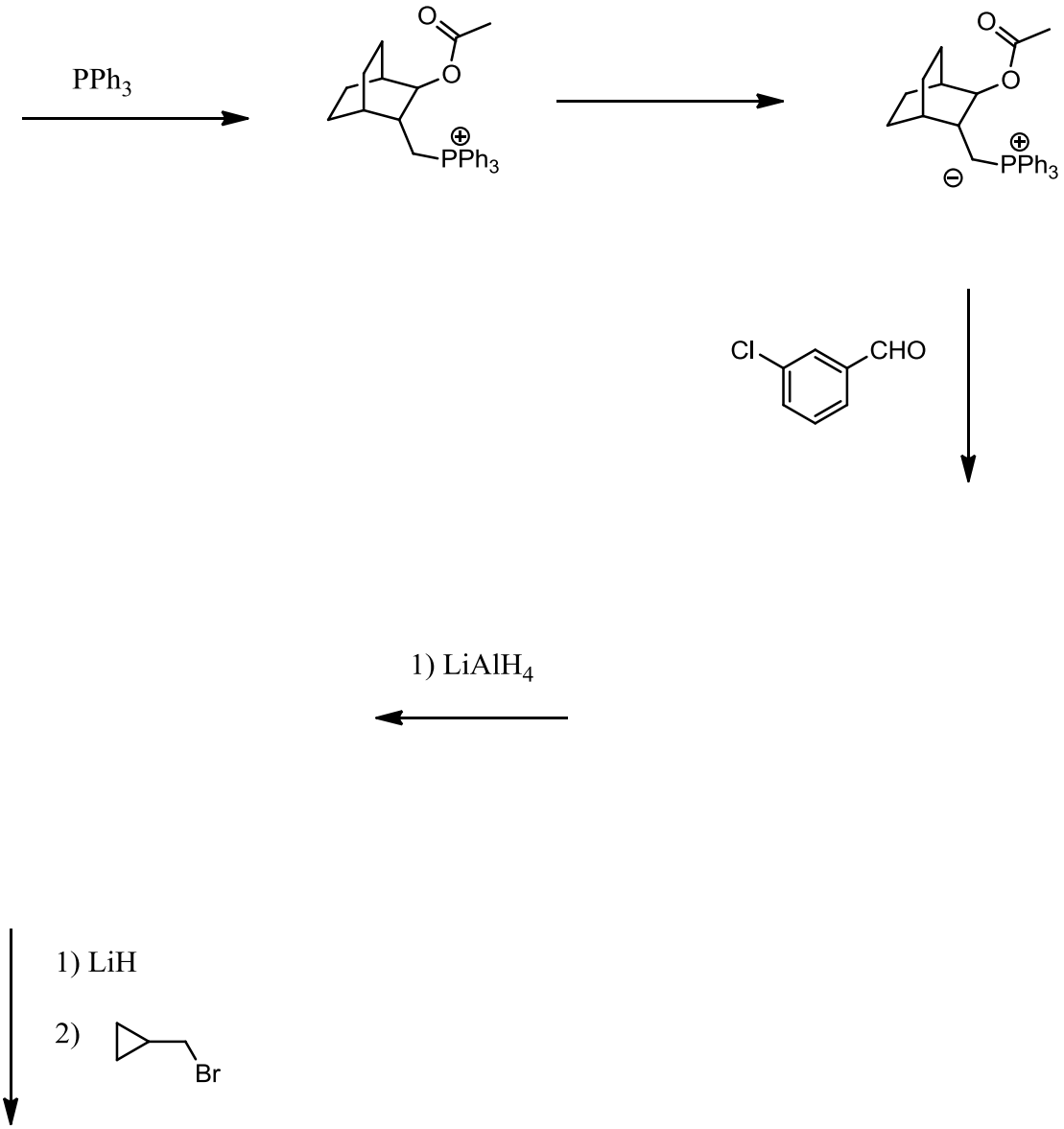
32- The molecule below is an unstable intermediate in the mechanism of the Wittig reaction. Use arrow-pushing to show the rest of the mechanism and draw the major product in the right configuration.



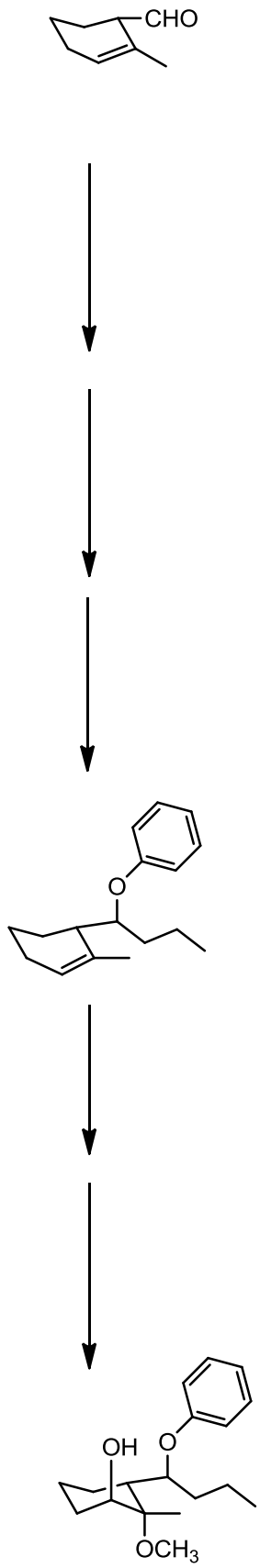
33- Draw the missing intermediates and reagents for the scheme below
(4 ANSWERS are needed)



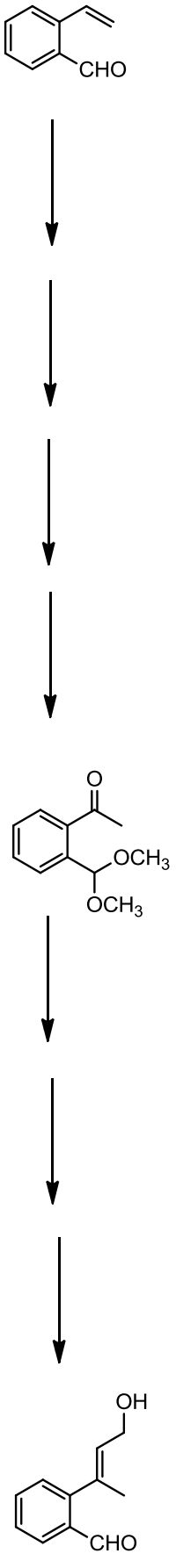
34- Draw the starting material, and the missing reagents and intermediates in the scheme below. (5 ANSWERS are needed)



35- Draw the missing reagents for the multistep synthesis below. Each arrow is one reaction step, that is, all the reagents listed next to one arrow are mixed together for the reaction.



36- Draw the missing reagents for the multistep synthesis below. Each arrow is one reaction step, that is all the reagents listed next to one arrow are mixed together for the reaction.



Scrap page